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POSTWAR TRENDS IN SOVIET FERROUS METALLURGY

/Numbers in parentheses refer to appended list of sources/

1946 PRODUCTION

In 1946, production of pig iron increased 12.2 percent over 1945, steel 12.8 percent, rolled metal 12.8 percent, and coke 11.8 percent. The increase in iron ore, 21.8 percent, and in pipe, 37.7 percent, was particularly great. In the South, the increase was as follows: pig iron and steel, nearly 80 percent; rolled metal and coke more than 60 percent; and production of iron pipe, more than 100 percent.

/In 1946, output of steel was 109 percent of 1945 output; pig iron, 112 percent; and rolled metal, 113 percent. In the areas formerly occupied by the Germans, pig-iron production in 1946 increased 59 percent over 1945 production. -- Stal', Vol VII, No 1, Jan 47/

	1946 in % of 1945
Railroad rails	279.6
Section iron	165.6
Beams and girders	196.0
Sheet iron	151.4
Wire rod	141.8
Roofing iron	169.8
Black plate	132.5
Drilling pipe	155.5
Casing pipe	231.9
Oil pipe-line pipe	133.4

In 1946, the coefficient for consumption of metal per ton of rolled products was decreased. In the majority of plants, the norm for ore consumption was also decreased, despite the decrease in consumption of metallic additives. Supply conditions of ore and metallic additives were somewhat worse in 1946 than in 1945.

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In 1947, output of the most needed types of products will be increased as follows: railroad rails, 44 percent over 1946; roofing iron, 22.7 percent; transformer steel, 74.8 percent; dynamo steel, 52.3 percent; tin plate, 114.3 percent; iron pipe, 28.1 percent, including 41.2 percent for drill pipe for the petroleum industry.

In 1947, the plan for capital construction in ferrous metallurgy calls for an increase of 35 percent over 1946.(1)

1947 PRODUCTION

Ferrous metallurgy in the USSR achieved considerable successes in 1947. The increase in pig-iron smelting over 1946 was 14 percent, steel 9 percent, production of rolled products 16 percent; iron pipe 19 percent, production of coke 13.5 percent, and output of iron ore 20.4 percent.

In the reconstructed plants of the south, the increases were as follows: pig iron 30 percent, steel 18.5 percent, rolled metal 39 percent, iron pipe 36.5 percent, and coke 35 percent. Successes in the restoration of the Krivbass resulted in an increase of 50 percent in the mining of iron ore.

In 1947, the industry had the task of making a particularly great increase in the output of a number of those rolled profiles of great importance to the national economy. The industry for the most part successfully met this task. Output of railroad rails increased 21 percent, mine rails 17 percent, roofing tin 22 percent, electrical engineering steels 50 percent, and tin plate 30 percent.

With the completion of the first section of "Zaporozhstal'," production of cold-rolled sheet for the automobile industry was resumed. Production of seamless rolled wheels for railroad rolling stock was begun for the first time after the war. Production of pipe for the petroleum industry increased considerably as did other types of pipe in great demand by industry and construction.

In the southern plants alone, 28 new profiles were adopted for production and production of ten profiles was resumed. A number of new profiles for the automobile industry, construction, and electrical engineering industry began to be produced.

Production of new low-alloy steels, smelted with alloy waste products, is being developed. Production of sheets, pipe, and other rolled products from these steels has been adopted. Considerable successes were achieved in the production of precision alloys. Production of new grades of steel and types of metal was furthered, particularly new steels for boilers and turbines.

In 1948, production of railroad rails, roofing tin, transformer steels and dynamo steels, and tin plate, products now in greatest demand by the national economy, will be stressed first of all. Output of sheet for the automobile industry and seamless rolled wheels for railroad transport will be increased sharply. In the Krivoy Rog Basin, several mines will start output of ore graded according to size in three classes. Output of low-alloy steel for industrial construction, bridge building, railroad car building, and other purposes, is being expanded and output of new grades of low-alloy steel for transport-machine building will be adopted.

New profiles of steel for automobile and shipbuilding, coal industry, construction, hydraulic engineering structures, and other purposes, are being adopted to production. Rolling of new grades of electrical engineering steel with particularly high content of special properties is being considerably expanded. Pipe

plants must start production of large numbers of new types of pipe, particularly casing, drilling, and pump-compressor pipe for the petroleum industry. The ferroalloy industry will go further in improving technology and adopting new alloys. In the coke industry, new and more effective methods of concentrating coal for coke must be introduced as extensively as possible. The refractories industry will adopt production of a large number of new refractories.(2)

Another important technological problem is the establishment of an effective method of operating the tilting open-hearth furnaces of the "Azovstal'" Plant on phosphoritic pig iron. The good quality of the rail steel made from phosphoritic pig iron, in experimental melts conducted before the war at "Azovstal'," has been proved by the results of the service of these rails on tracks. However, the quantitative indexes of the performance of the tilting open-hearths on this type of pig iron are not yet satisfactory.

BESSEMER AND THOMAS STEEL PRODUCTION

Before the war, converter production of steel amounted to no more than 9-10 percent of all steel smelted in the USSR. In 1941, at the Kerch' Plant, construction was completed on two acid converters for preliminary treatment of pig iron for the purpose of recovering vanadium. For this same purpose, during the war a Bessemer shop was built and put into operation at the Chusovoy Plant. To increase the quality of Bessemer steel, an improved method of deoxidizing rail steel (with the addition of aluminum at the rate of 0.8-1.0 kilograms per ton) was adopted at the Plant imeni Petrovskiy. In 1940-41 production of killed Thomas steel, deoxidized with aluminum (1.0-1.2 kilograms per ton), designed for use in structures with impact stress and for service in low-temperature conditions, was started at the Kerch' Plant in place of rimming Thomas steel. This steel successfully passed toughness tests at normal and low temperatures.

Production of converter steel stopped with the war and occupation. In 1943, with the restoration of the Yenakiyevo Plant, production of Bessemer rail steel was resumed as were tests of the dephosphorization of steel in the ladle by a hard mixture.

Another 15 converters will be restored and built during the new Five-Year Plan. The Bessemer metal of the Yenakiyevo Plant, Plant imeni Petrovskiy, and Plant imeni Dzerzhinskiy will be used primarily for rails. The favorable prospects for developing ferrous metallurgy on the basis of Kerch' phosphorus ores gives the future development of Thomas steel production in the USSR particular importance at present. The best method for converting phosphoritic pig iron into steel must therefore be developed during the Five-Year Plan.

The swing away from the Thomas converter was based mainly on the unsatisfactory work of the Kerch' Plant, particularly in the wide variation of silicon content and the high sulphur content of the pig iron. On this basis, it was decided that production of standard Thomas pig iron was impossible under Kerch' Plant conditions. However, the successful work of the Kerch' Plant just before the war (1940-41) completely reversed this position and showed that with the addition in the charge of up to 20 percent of Krivoy Rog ore and adoption of desulfurization outside of the blast furnace, a standard Thomas pig iron could be obtained. In operating without the addition of Krivoy Rog ore, a pig iron with a high phosphorus content is obtained (approximately 2.3 percent phosphorus) from which it is possible to obtain a standard-quality steel in the Thomas converter where sufficient quantity of scrap is added as a cooling agent. Also in 1940-41 at the Kerch' Plant, an improvement in the quality of Thomas steel was obtained. For this reason, the following must be taken into account: the technological advantages of the Thomas process over the open-hearth for reprocessing phosphoritic pig iron, the decreased capital expenditures involved (on a national-

economic scale) in the Thomas process, and the fuller recovery of vanadium from the pig iron, since in the drawing off of the vanadium-bearing slag from open-hearths, nearly 20 percent of the slag, remains in the furnace.

The usual deficiency of Thomas steel -- increased nitrogen content as compared with open-hearth steel -- can be mitigated to a considerable degree by making necessary changes in the dimensions of the converter and by use of improved methods of blowing (N.R.N. method). Moreover, the deoxidation of Thomas steel by addition of aluminum (0.8-1.5 kilograms per ton) considerably cuts down on the nitrogen content, combining it in the form of nitrides of aluminum. With complete surety it can therefore be said that Thomas steel made by improved methods will have a much wider field of utilization in the USSR than it had with the prewar production of the Kerch' Plant.(3)

SOURCES

1. Stal', Vol VII, No 8, Aug 47

2. Stal', Vol VIII, No 1, Jan 48

3. Stal', Vol VII, No 11, Nov 47

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